HW#8 For the problem at right, list all possible column choices, determine which belong to each of the three categories (feasible, infeasible, not basic), evaluate the objective function at each basic solution. Write down the linear system corresponding to each (nonsingular) one. Determine the maximizing and the minimizing solutions.

\[
\begin{align*}
\text{min/max } & x_1 + 3x_2 + 2x_3 + x_4 + x_5 \\
\text{subject to } & \\
& x_1 + x_3 + 2x_4 + 2x_5 = 2 \\
& x_2 + x_3 + 2x_4 = 5 \\
& \text{all variables } \geq 0
\end{align*}
\]

HW#9 Consider the following linear programming problem:

to maximize \( z=x+2y \) subject to the constraints
\[
\begin{align*}
x & \geq 0, \\
y & \geq 0, \\
y & \leq 2, \\
x+y & \leq 4, \\
y-x & \leq 1
\end{align*}
\]

a) Find all the vertices of the feasible polygon (by inspection).
b) Find the maximum value and a point in the polygon where the maximum is achieved, using the simplex method. Use \((0,0)\) as the initial basic feasible solution.

HW#10 Make up a LP for which the feasible set is a regular octahedron, and for which the optimal values are achieved on an edge. (Hint: the six points \((\pm1,0,0), (0,\pm1,0), (0,0,\pm1)\) are the vertices of a regular octahedron.)

HW#11 Execute both phases of the simplex algorithm for the following problem:

\[
\begin{align*}
\text{max } & x_2 \\
\text{subject to } & \\
x_1 + x_2 & \geq 1 \\
x_1 & \leq 2 \\
x_2 & \leq 2 + 0.5 \ x_1 \\
x_1, x_2 & \geq 0
\end{align*}
\]